ROYAL ASTRONOMICAL SOCIETY.

Vol. II. *December* 9, 1831. No. 8.

The following communications were read: viz.

I. On the *proper motion* of the Fixed Stars, by Francis Baily, Esq.—The author sets out with lamenting the little attention that has been paid to this subject by preceding astronomers; and though he by no means pretends that this paper should be considered as a perfect essay on it, yet he hopes it will be sufficient to induce the practical astronomer to turn his attention to this neglected branch of the science. The most satisfactory mode of determining the proper motion of a fixed star, the author remarks, is by a comparison of two catalogues of distant epochs; for if the difference in its position, at the two epochs, does not correspond with the amount of the precession of the equinoxes, there is good reason to suspect that the star has a proper motion of its own, particularly if the difference exceed what may be fairly attributed to the errors of observation. But even this is not always a sure guide, unless the interval be considerable; for the errors of the instrument, the unavoidable mistakes committed in the reduction of the stars, and the errors of the press, are occasionally mixed up in such a manner that we are frequently at a loss to know where the truth lies. Moreover, the differences in the constants employed in the reduction of the observations themselves may mislead us, and induce us to suspect a proper motion, when there is, in fact, no foundation for such an opinion. *Two* catalogues, therefore, are not always enough to enable us to decide with confidence that any particular star has a proper motion of its own; a *third* becomes necessary to determine the question with the requisite degree of accuracy; and where these are discordant, a *fourth* is absolutely essential, in order to shew where the error exists.

Mr. Baily then proceeds to state, that he has selected the catalogues of Bradley and Piazzi for determining the proper motion (μ') of any proposed star for the *first period*, viz. from 1755 to 1800, and the catalogues of Piazzi and Pond for the proper motion (μ'') for the *second period*, viz. from 1800 to 1830; at the same time stating, that he has also adopted some recent determinations in right ascension, by Professor Airy and Dr. Robinson, in addition to those of Mr. Pond. The formulæ by which the proper motions for these two periods are deduced are as follow; viz.

$$\mu' = \frac{P - B}{45} - \frac{p + \pi}{2}$$

$$\mu'' = \frac{S - P}{30} - \left(p + \frac{p - \pi}{3}\right)$$

where P denotes the place of the star in Piazzi's catalogue, B the place of the star in Bradley's catalogue; p the annual precession in 1800, π the annual precession in 1755, both taken from M. Bessel's catalogue in the *Fund. Astron.*; and S the place of the star for the year 1830, the right ascensions *being reduced to the same equinoctial point* as those of B and P.

It is in this manner that Mr. Baily has compared the places of all those stars which are known (or which have been supposed) to be affected with an annual proper motion of not less than about $0''{,}50$ of a great circle, and has given a list of upwards of three hundred of such stars, with the amount of their annual proper motion (in right ascension and declination) for the two periods above mentioned. The author remarks, that when the annual proper motions of any given star thus deduced, for the two periods, correspond with each other, there is every reason to believe that such proper motion is correct; but that where they differ, (and this is by no means a rare occurrence, at once shewing the difficulty of the subject,) the probable conclusion is, that such stars have very little proper motion, or perhaps none at all; and that, at all events, further observations are necessary to decide so delicate yet so important a point. Mr. Baily concludes by remarking, that "our "information is at present but slight, and not always satisfactory. "When future observations shall have increased our stock of know-"ledge, the subject may probably be taken up by others, who will "have better means of following it up more in detail than I have "been able to do with the present scanty materials."

II. The reading of Mr. Herschel's paper on the Orbits of Binary Stars was continued; but as it could not be finished this evening, the conclusion was deferred till the next meeting.

After the meeting, Mr. Bate exhibited a machine for the illustration of the precession of the equinoxes. It consists of a pair of flexible hoops or rings, about nine inches diameter, representing a globe mounted on an axis which forms its poles, and to which a rapid motion is given, (being the same construction as is usually employed to shew the enlargement of the equatorial diameter by the centrifugal force.) The axis of these hoops centres in a brass meridian, which is also mounted in delicate vertical centres in a wooden frame, to which the axis of the hoops is inclined at an angle of $23\frac{1}{2}°$, a clock-spring movement is attached to the axis of the hoops, and the whole is carefully balanced, and stripped of friction as far as possible.

The clock-movement being wound up and restrained from action by a small click or trigger, on the removal of this click a very rapid motion, from west to east, is given to the inclined axis and flexible hoops, the upper pole of which becomes gradually depressed, by which depression the flexible hoops assume the figure of an oblate spheroid, in the usual manner. When this is acquired, the brass meridian receives a very slow movement from east to west, and it is

the retrograde motion of this meridian which is charged with representing the precession of the equinoxes.

Baron de Drais also exhibited two instruments; one for converting mechanically the area of any figure of a regular form into the corresponding area of a triangle, square, or parallelogram: and the other for *clearing the distance* in lunar observations, without the aid of computation.

Stars observed with the Moon, at the Royal Observatory, Greenwich.

1831.		h	m	s	
Nov. 13	☽ 1 L	22	19	22,86	
	70 Aquarii	22	40	45,60	
	K Aquarii	22	45	43,80	
15	η Piscium....	23	40	27,84	
	24 Piscium....	23	45	27,32	
	P Piscium....	23	51	13,92	
	☽ 1 L.	0	3	55,90	
19	☽ 2 L.	3	58	29,40	Sky hazy.
	48 Tauri.....	4	7	33,30	
	γ Tauri.....	4	11	33,16	
	π Tauri.....	4	18	26,10	
	Aldebaran....	4	27	36,14	
26	☽ 2 L.	11	10	11,24	
	β Virginis....	11	43	23,59	

J. Moyes, 28, Castle Street, Leicester Square.